REMARKS

Applicants have amended their claims in order to further clarify the definition of various aspects of the present invention. Specifically, each of claims 1-4 has been amended to recite that the first reactor is a uniaxial horizontal agitation reactor without any agitator center shaft, and to recite that the second reactor is a horizontal biaxial agitation reactor. Claims 1 and 2 have been further amended to set forth the proper dimensions for the liquid viscosity. Claims 3 and 4 have been further amended to recite that the first reactor has a first liquid viscosity range from 1 Pa·s to 1,000 Pa·s. In connection with these previously considered claims, note, for example, pages 5-7 of Applicants' specification. Claim 4 has also been amended to correct a typographical error.

In addition, Applicants are adding new claims 5-12 to the application. Claims 5, 7, 9 and 11, dependent respectively on claims 1-4, recite that the uniaxial horizontal agitation reactor includes a horizontal cylindrical vessel and agitation blades annularly distributed and successively arranged through the vessel and secured at positions deviated from a rotating axis toward an inner wall of the vessel without any agitator center shaft; and claims 6, 8, 10 and 12, dependent respectively on claims 5, 7, 9 and 11, recite that the horizontal biaxial agitation reactor has lattice blades. Note, for example, pages 5-7 of Applicants' specification.

Applicants respectfully submit that all of the claims now presented for consideration by the Examiner patentably distinguish over the teachings of the references applied by the Examiner in rejecting claims in the Office Action mailed October 14, 2003, that is, the teachings of the U.S. patents to Oshino, et al.,

No. 5,498,688, and to Kuze, et al., No. 5,459,225, under the provisions of 35 USC §102 and 35 USC §103.

It is respectfully submitted that these references as applied by the Examiner would have neither taught nor would have suggested such an apparatus or method for continuously producing polycarbonate, as in the present claims, including, inter alia, use of first and second reactors respectively which is a uniaxial horizontal agitation reactor without any agitator center shaft and which is a horizontal biaxial agitation reactor, the first reactor having a liquid viscosity range from 1 Pa·s to 1,000 Pa·s (see claims 1-4), and, more particularly, wherein the second reactor has a liquid viscosity range from 100 Pa·s to 5,000 Pa·s (see claims 1 and 2).

Moreover, it is respectfully submitted that these references would have neither disclosed nor would have suggested such apparatus or such method having features as discussed previously, and furthermore wherein the uniaxial horizontal agitation reactor includes a horizontal cylindrical vessel and agitation blades annularly distributed and successively arranged through the vessel and secured at positions deviated from a rotating axis toward an inner wall of the vessel without any agitator center shaft (see claims 5, 7, 9 and 11); and/or wherein the horizontal biaxial agitation reactor has lattice blades (see claims 6, 8, 10 and 12).

The present invention is directed to a process and apparatus for producing polycarbonate, suitable, for example, for producing polycarbonate from diphenyl carbonate and an alcohol such as bisphenol A as raw materials, by transesterification upon mixing with a reaction catalyst and additives.

As described in the paragraph bridging pages 1 and 2 of Applicants' specification, there has been described a continuous agitation reactor as a

polymerization apparatus, which can provide extrusion flow characteristics, that is, a large number of mixing vessels as ganged together in series, but such apparatus has problems in connection with highly viscous liquid, which tends to attach to the surface of the agitator center shaft and reside thereon with increasing liquid viscosity. This means, for example, that a portion of the liquid resides in the dead zone of agitation, resulting in a problem of deterioration of polymer quality.

Against this background, Applicants provide a method, and apparatus, where such deterioration of polymer quality can be avoided, in producing polycarbonate as a polymerization product polymer. Specifically, Applicants have found that through use of the first and second reactors which are both horizontal reactors, the first reactor being a uniaxial horizontal agitation reactor without any agitator center shaft and the second reactor being a horizontal biaxial agitation reactor, problems in connection with previously proposed apparatuses can be avoided; and, in particular, residence of a portion of the liquid in the dead zone of agitation can be avoided, such that deterioration of polymer quality due thereto can be avoided.

That is, through use of the first and second reactors which are both horizontal reactors, having specified structure, according to the present invention, a product having improved quality can be achieved.

Oshino, et al. discloses a process for the preparation of a discoloration-free, high-molecular weight (co)polycarbonate by polycondensing a dihydroxy compound with a carbonic diester in the presence of a transesterification catalyst. The process includes a first step of reacting a dihydroxy compound with a carbonic diester in a reactor in which the surface area of which contact with the dihydroxy compound and the carbonic diester is made of a material containing iron in an amount of 20% by

weight or less, to give a prepolymer; and in the second step, melt-polycondensing the prepolymer in a reactor other than the reactor used in the first step. Note, column 1, lines 13-17; and the paragraph bridging columns 2 and 3 of this patent. This patent goes on to disclose that the reactor used in the first step is preferably a tub-type reactor, and the reactor used in the second step is preferably a horizontal vented extruder. The first step is preferably effected by a batch-wise process, and the second step is preferably effected by a continuous process. See column 3, lines 44-49. Note also column 4, lines 3-16; and column 6, lines 25-30 and 39-47.

Note that Oshino, et al. does not disclose, nor would have suggested, the first and second horizontal reactors, much less the specific structure of such reactors as in claims 1-4 and as further defined in claims 5-12. Noting especially that Oshino, et al. discloses that the reactor used in the first step is preferably a tub-type reactor, showing a vertical first reactor in Fig. 1 of Oshino, et al., it is respectfully submitted that this reference would have taught away from the apparatus and method of use thereof as in the present claims, including the first and second reactor structure, and advantages thereof.

Kuze, et al. discloses a process for producing a polycarbonate, by transesterifying, in the presence of an antioxidant, (A) a dihydroxy compound and (B) a carbonic acid diester having, as an impurity, a chlorine content (derived from a chloroformate group) of at most 30 ppm, the technique for determining chlorine content being defined. See column 2, lines 1-9. This patent goes on to disclose that the reaction can be performed batchwise or continuously, and in any equipment; and that when the reaction is performed in a continuous system, at least two reactors should be used to provide the described reaction conditions. This patent goes on to

disclose that reactors having a stirring function for high viscosities are preferred, since the viscosity rises in the latter stage of reaction, although the structure of the reactor to be used is not particularly limited. This patent goes on to describe that the reactor is not limited to the tank-type, but may also be an extruder-type.

Kuze, et al. is primarily concerned with reaction conditions, only generally disclosing the apparatus used. It is respectfully submitted that the disclosure of this patent does not teach, nor would have suggested, the presently claimed invention, including the first and second reactors being horizontal reactors, and more specifically the defined structure of such first and second reactors, providing advantages as discussed in the foregoing.

Contentions by the Examiner on page 5 of the Office Action mailed October 14, 2003, are noted. Suffice it to say that each of claims 1-4 recites that the first reactor is without any agitator center shaft.

In view of the foregoing comments and amendments, reconsideration and allowance of all claims presently in the application are respectfully requested.

To the extent necessary, Applicants petition for an extension of time under 37 CFR 1.136. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to the Antonelli, Terry, Stout & Kraus,

LLP Deposit Account No. 01-2135 (Docket No. 500.38277CV3), and please credit any excess fees to such Deposit Account.

Respectfully submitted,

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